

SEQUENCE LISTING

<110> Famodu, Layo O.
Orozco, Buddy
Rafalski, Antoni

<120> Plant Aminoacyl-tRNA Synthetase

<130> BB-1191

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<150> 60/092,866

<151> July 15, 1998

<160> 29

<170> Microsoft Office 97

<210> 1

<211> 1948

<212> DNA

<213> Zea mays

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<211> 546
<212> PRT
<213> Zea mays

<400> 2
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35 40 45
Gln Gln Gln Gln Pro Ala Asp Ala Glu Asp Pro Phe Ala Ala Asn
50 55 60
Tyr Gly Glu Val Pro Val Glu Glu Ile Gln Ser Lys Ala Ile Ser Gly
65 70 75 80
Arg Ser Trp Ser His Val Gly Asp Leu Asp Asp Ser Ala Ala Gly Arg
85 90 95
Ser Val Leu Ile Arg Gly Ala Ala Gln Ala Ile Arg Pro Val Ser Lys
100 105 110
Lys Met Ala Phe Val Val Leu Arg Gln Ser Met Ser Thr Val Gln Cys
115 120 125
Val Leu Val Ala Ser Ala Asp Ala Gly Val Ser Thr Gln Met Val Arg
130 135 140
Phe Ala Thr Ala Leu Ser Lys Glu Ser Ile Val Asp Val Glu Gly Val
145 150 155 160
Val Ser Leu Pro Lys Glu Pro Leu Lys Ala Thr Thr Gln Gln Val Glu
165 170 175
Ile Gln Val Arg Lys Ile Tyr Cys Ile Asn Arg Ala Ile Pro Thr Leu
180 185 190
Pro Ile Asn Leu Glu Asp Ala Ala Arg Ser Glu Ala Asp Phe Glu Lys
195 200 205
Ala Glu Leu Ala Gly Glu Lys Leu Val Arg Val Gly Gln Asp Thr Arg
210 215 220
Leu Asn Tyr Arg Ala Ile Asp Leu Arg Thr Pro Ser Asn Gln Ala Ile
225 230 235 240
Phe Arg Ile Gln Cys Gln Val Glu Asn Lys Phe Arg Asp Phe Leu Leu
245 250 255
Ser Lys Asn Phe Val Gly Ile His Thr Pro Lys Leu Ile Ser Gly Ser
260 265 270
Ser Glu Gly Gly Ala Ala Val Phe Lys Leu Leu Tyr Asn Gly Gln Pro
275 280 285

Ala Cys Leu Ala Gln Ser Pro Gln Leu Tyr Lys Gln Met Ala Ile Ser
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 Gly Gly Phe Glu Arg Val Phe Glu Val Gly Pro Val Phe Arg Ala Glu
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 Asn Ser Asn Thr His Arg His Leu Cys Glu Phe Val Gly Leu Asp Ala
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 Glu Met Glu Ile Lys Glu His Tyr Phe Glu Val Cys Asp Ile Ile Asp
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 Gly Leu Phe Val Ser Ile Phe Lys His Leu Ser Glu Asn Cys Lys Lys
 355 360 365
 Glu Leu Glu Ser Ile Asn Arg Gln Tyr Pro Phe Glu Pro Leu Lys Tyr
 370 375 380
 Leu Asp Lys Thr Phe Lys Leu Thr Tyr Glu Glu Gly Ile Gln Met Leu
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 Lys Glu Ala Gly Thr Glu Ile Glu Pro Met Gly Asp Leu Asn Thr Glu
 405 410 415
 Ala Glu Lys Lys Leu Gly Arg Leu Val Arg Glu Lys Tyr Asp Thr Asp
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 Phe Phe Ile Leu Tyr Arg Tyr Pro Leu Ala Val Arg Pro Phe Tyr Thr
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 Met Pro Cys Tyr Asp Asn Pro Ala Tyr Thr Asn Ser Phe Asp Val Phe
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 465 470 475 480
 Glu Leu Leu Ala Lys Arg Ala Thr Glu Cys Gly Ile Asp Val Ser Thr
 485 490 495
 Ile Ser Ala Tyr Ile Glu Ser Phe Ser Tyr Gly Val Pro Pro His Gly
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 Gly Phe Gly Val Gly Leu Glu Arg Val Val Met Leu Phe Cys Ala Leu
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 Asn Asn Ile Arg Lys Thr Ser Leu Phe Pro Arg Asp Pro Gln Arg Leu
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 Val Pro
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 <212> DNA
 <213> Oryza sativa
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 <212> PRT
 <213> Oryza sativa

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Thr Glu Phe Phe Ile Leu Tyr Arg Tyr Pro Leu Ala Val Arg Pro Phe
 35 40 45

Tyr Thr Met Pro Cys Tyr Asp Asn Pro Ala Tyr Ser Asn Ser Phe Asp
 50 55 60

Val Phe Ile Arg Gly Glu Glu Ile Ile Ser Gly Ala Gln Arg Ile His
 65 70 75 80

Leu Pro Glu Leu Leu Thr Lys Arg Ala Thr Glu Cys Gly Ile Asp Ala
 85 90 95

Ser Thr Ile Ser Ser Tyr Ile Glu Ser Phe Ser Tyr Gly Ala Pro Pro
 100 105 110

His Gly Gly Phe Gly Val Gly Leu Glu Arg Val Val Met Leu Phe Cys
 115 120 125

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Arg Leu Val Pro
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 <212> DNA
 <213> Glycine max

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 <211> 369
 <212> PRT
 <213> Glycine max

<400> 6
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 35 40 45

Ser Ala Pro Ile Lys Gly Ala Thr Gln Gln Val Glu Ile Gln Val Arg
 50 55 60

Lys Leu Tyr Cys Val Ser Arg Ala Val Pro Thr Leu Pro Ile Asn Leu
 65 70 75 80

Glu Asp Ala Ala Arg Ser Glu Val Glu Ile Glu Thr Ala Leu Gln Ala
 85 90 95

Gly Glu Gln Leu Val Arg Val Asn Gln Asp Thr Arg Leu Asn Phe Arg
 100 105 110

Val Leu Asp Val Arg Thr Pro Ala Asn Gln Gly Ile Phe Arg Ile Gln
 115 120 125

Ser Gln Val Gly Asn Ala Phe Arg Gln Phe Leu Ser Glu Gly Phe
 130 135 140

Cys Glu Ile His Thr Pro Lys Leu Ile Ala Gly Ser Ser Glu Gly Gly
 145 150 155 160

Ala Ala Val Phe Arg Leu Asp Tyr Lys Gly Gln Pro Ala Cys Leu Ala
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Gln Ser Pro Gln Leu His Lys Gln Met Ser Ile Cys Gly Asp Phe Gly
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Arg Val Phe Glu Ile Gly Pro Val Phe Arg Ala Glu Asp Ser Tyr Thr
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His Arg His Leu Cys Glu Phe Thr Gly Leu Asp Val Glu Met Glu Ile
 210 215 220

Lys Lys His Tyr Phe Glu Val Met Asp Ile Val Asp Arg Leu Phe Val
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Ala Met Phe Asp Ser Leu Asn Gln Asn Cys Lys Lys Asp Leu Glu Ala
245 250 255

Val Gly Ser Gln Tyr Pro Phe Glu Pro Leu Lys Tyr Leu Arg Thr Thr
260 265 270

Leu Arg Leu Thr Tyr Glu Glu Gly Ile Gln Met Leu Lys Asp Val Gly
275 280 285

Val Glu Ile Glu Pro Tyr Gly Asp Leu Asn Thr Glu Ala Glu Arg Lys
290 295 300

Leu Gly Gln Leu Val Ser Glu Lys Tyr Gly Thr Glu Phe Tyr Ile Leu
305 310 315 320

His Arg Tyr Pro Leu Ala Val Arg Pro Phe Tyr Thr Met Pro Cys Tyr
325 330 335

Asp Asn Pro Ala Tyr Ser Asn Ser Phe Asp Val Phe Ile Arg Gly Glu
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Glu Ile Ile Ser Gly Ala Gln Arg Val His Val Pro Glu Phe Leu Glu
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Gln

<210> 7

<211> 836

<212> DNA

<213> Triticum aestivum

<400> 7

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<211> 98

<212> PRT

<213> Triticum aestivum

<400> 8

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20 25 30

Pro Ala Tyr Leu Ala Gln Ser Leu Gln Ser Tyr Lys Gln Met Ser Ile
35 40 45

Cys Gly Gly Phe Gly Arg Val Phe Glu Ala Gly Pro Val Phe Arg Ser
50 55 60

Glu Lys Ser Asn Thr His Arg His Leu Cys Glu Phe Ile Gly Leu Asp
65 70 75 80

Ala Glu Met Glu Ile Lys Glu His Tyr Phe Glu Val Cys Asp Ile Ile
85 90 95

Asp Cys

<210> 9
<211> 2085
<212> DNA
<213> Zea mays

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<210> 10
<211> 599
<212> PRT
<213> Zea mays

<400> 10
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35 40 45

Ala Thr Met Ala Lys Glu Ala Gln Ser Pro Pro Ser Ala Thr Ile Ala
50 55 60

Glu Ala Thr Ala Pro Pro Gln Leu Leu Leu Phe Asn Ser Phe Thr Lys
65 , 70 75 80

Arg Glu Glu Pro Phe Gln Pro Arg Val Glu Gly Lys Val Gly Met Tyr
85 90 95

Val Cys Gly Val Thr Pro Tyr Asp Phe Ser His Ile Gly His Ala Arg
100 105 110

Ala Tyr Val Ala Phe Asp Val Leu Tyr Arg Tyr Leu Lys Phe Leu Gly
115 120 125

Tyr Glu Val Glu Tyr Val Arg Asn Phe Thr Asp Ile Asp Asp Lys Ile
130 135 140

Ile Lys Arg Ala Asn Glu Arg Gly Glu Thr Val Thr Ser Leu Ser Ser
145 150 155 160

Gln Phe Ile Asn Glu Phe Leu Leu Asp Met Thr Glu Leu Gln Cys Leu
165 170 175

Pro Pro Thr Cys Glu Pro Arg Val Thr Glu His Ile Glu His Ile Ile
180 185 190

Lys Leu Ile Thr Gln Ile Met Glu Asn Gly Lys Ala Tyr Ala Ile Glu
195 200 205

Gly Asp Val Tyr Phe Ser Val Glu Ser Phe Pro Glu Tyr Leu Ser Leu
210 215 220

Ser Gly Arg Lys Phe Asp Gln Asn Gln Ala Gly Ala Arg Val Ala Phe
225 230 235 240

Asp Thr Arg Lys Arg Asn Pro Ala Asp Phe Ala Leu Trp Lys Ala Ala
245 250 255

Lys Glu Gly Glu Pro Phe Trp Asp Ser Pro Trp Gly Arg Gly Arg Pro
260 265 270

Gly Trp His Ile Glu Cys Ser Ala Met Ser Ala His Tyr Leu Gly His
275 280 285

Val Phe Asp Ile His Gly Gly Lys Asp Leu Ile Phe Pro His His
290 295 300

Glu Asn Glu Leu Ala Gln Ser Arg Ala Ala Tyr Pro Asp Ser Glu Val
305 310 315 320

Lys Cys Trp Met His Asn Gly Phe Val Asn Lys Asp Asp Lys Lys Met
325 330 335

Ala Lys Ser Asp Asn Asn Phe Phe Thr Ile Arg Asp Ile Ile Ala Leu
340 345 350

Tyr His Pro Met Ala Leu Arg Phe Phe Leu Met Arg Thr His Tyr Arg
355 360 365

Ser Asp Val Asn His Ser Asp Gln Ala Leu Glu Ile Ala Ser Asp Arg
370 375 380

Val Tyr Tyr Ile Tyr Gln Thr Leu Tyr Asp Cys Glu Glu Val Leu Ala
385 , 390 395 400

Thr Tyr Arg Glu Glu Gly Thr Ser Leu Pro Val Pro Ser Glu Glu Gln
405 410 415

Asn Leu Ile Gly Lys His His Ser Glu Phe Leu Lys His Met Ser Asn
420 425 430

Asp Leu Lys Thr Thr Asp Val Leu Asp Arg Cys Phe Met Glu Leu Leu
435 440 445

Lys Ala Ile Asn Ser Ser Leu Asn Asp Leu Lys Lys Leu Gln Gln Lys
450 455 460

Ile Glu Gln Gln Lys Lys Gln Gln Gln Gln Lys Lys Gln Gln Gln
465 470 475 480

Gln Lys Gln Gln Gln Lys Gln Gln Gln Leu Gln Lys Gln Pro Glu
485 490 495

Asp Tyr Ile Gln Ala Leu Ile Ala Leu Glu Thr Glu Leu Lys Asn Lys
500 505 510

Leu Ser Ile Leu Gly Leu Met Pro Ser Ser Ser Leu Ala Glu Val Leu
515 520 525

Lys Gln Leu Lys Asp Lys Ser Leu Lys Arg Ala Gly Leu Thr Glu Glu
530 535 540

Gln Leu Gln Glu Gln Ile Glu Gln Arg Asn Val Ala Arg Lys Asn Lys
545 550 555 560

Gln Phe Glu Ile Ser Asp Gly Ile Arg Lys Asn Leu Ala Thr Lys Gly
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Ile Ala Leu Met Asp Glu Pro Ser Gly Thr Val Trp Arg Pro Cys Glu
580 585 590

Pro Glu Arg Ser Glu Glu Ser
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<210> 11

<211> 1957

<212> DNA

<213> Oryza sativa

<400> 11

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<210> 12

<211> 548

<212> PRT

<213> Oryza sativa

<400> 12

Pro Val Leu Gly Leu Ala Arg Arg Arg Pro Ala Leu Ser Leu Ser Pro
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Ser Ala Leu Thr Met Ala Glu Ser Ala Lys Pro Thr Pro Gln Leu Glu
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Leu Phe Asn Ser Met Thr Lys Lys Lys Glu Leu Phe Glu Pro Leu Val
35 40 45

Glu Gly Lys Val Arg Met Tyr Val Cys Gly Val Thr Pro Tyr Asp Phe
50 55 60

Ser His Ile Gly His Ala Arg Ala Tyr Val Ala Phe Asp Val Leu Tyr
 65 70 75 80
 Arg Tyr Leu Lys Phe Leu Gly Tyr Glu Val Glu Tyr Val Arg Asn Phe
 85 90 95
 Thr Asp Ile Asp Asp Lys Ile Ile Lys Arg Ala Asn Glu Ala Gly Glu
 100 105 110
 Thr Val Thr Ser Leu Ser Ser Arg Phe Ile Asn Glu Phe Leu Leu Asp
 115 120 125
 Met Ala Gln Leu Gln Cys Leu Pro Pro Thr Cys Glu Pro Arg Val Thr
 130 135 140
 Asp His Ile Glu His Ile Ile Glu Leu Ile Thr Lys Ile Met Glu Asn
 145 150 155 160
 Gly Lys Ala Tyr Ala Met Glu Gly Asp Val Tyr Phe Ser Val Asp Thr
 165 170 175
 Phe Pro Glu Tyr Leu Ser Leu Ser Gly Arg Lys Leu Asp His Asn Leu
 180 185 190
 Ala Gly Ser Arg Val Ala Val Asp Thr Arg Lys Arg Asn Pro Ala Asp
 195 200 205
 Phe Ala Leu Trp Lys Ala Ala Lys Glu Gly Glu Pro Phe Trp Asp Ser
 210 215 220
 Pro Trp Gly Arg Gly Arg Pro Gly Trp His Ile Glu Cys Ser Ala Met
 225 230 235 240
 Ser Ala His Tyr Leu Gly His Val Phe Asp Ile His Gly Gly Lys
 245 250 255
 Asp Leu Ile Phe Pro His His Glu Asn Glu Leu Ala Gln Ser Arg Ala
 260 265 270
 Ala Tyr Pro Glu Ser Glu Val Lys Cys Trp Met His Asn Gly Phe Val
 275 280 285
 Asn Lys Asp Asp Gln Lys Met Ser Lys Ser Asp Lys Asn Phe Phe Thr
 290 295 300
 Ile Arg Asp Ile Ile Asp Leu Tyr His Pro Met Ala Leu Arg Phe Phe
 305 310 315 320
 Leu Met Arg Thr His Tyr Arg Gly Asp Val Asn His Ser Asp Lys Ala
 325 330 335
 Leu Glu Ile Ala Ser Asp Arg Val Tyr Tyr Ile Tyr Gln Thr Leu Tyr
 340 345 350
 Asp Cys Glu Glu Val Leu Ser Gln Tyr Arg Gly Glu Asn Ile Ser Val
 355 360 365
 Pro Val Pro Val Glu Glu Gln Asp Met Val Asn Lys His His Ser Glu
 370 375 380

Phe Leu Glu Ser Met Ala Asp Asp Leu Arg Thr Thr Asp Val Leu Asp
385 390 395 400

Gly Phe Thr Asp Leu Leu Lys Ala Ile Asn Ser Asn Leu Asn Asp Phe
405 410 415

Lys Lys Leu Gln Gln Lys Leu Glu Gln Gln Lys Lys Gln Gln Gln
420 425 430

Gln Lys Gln Gln Lys Gln Lys Gln Gln Ala Gln Lys Gln Pro Glu
435 440 445

Glu Tyr Ile Gln Ala Met Phe Ala Leu Glu Thr Glu Ile Lys Asn Lys
450 455 460

Ile Ser Ile Leu Gly Leu Met Pro Pro Ser Ser Leu Ala Glu Ala Leu
465 470 475 480

Lys Gln Leu Lys Asp Lys Ala Leu Lys Arg Ala Gly Leu Thr Glu Glu
485 490 495

Leu Leu Gln Glu Gln Ile Glu Gln Arg Thr Ala Ala Arg Lys Asn Lys
500 505 510

Gln Phe Asp Val Ser Asp Gln Ile Arg Lys Gln Leu Gly Ser Lys Gly
515 520 525

Ile Ala Leu Met Asp Glu Pro Thr Gly Thr Val Trp Arg Pro Cys Glu
530 535 540

Pro Glu Ser Glu
545

<210> 13

<211> 2183

<212> DNA

<213> Glycine max

<400> 13

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tgggatttga agtctgttat gttcgcaatt tcactgacgt agatgacaag ataattgtct 480
gagcaaggaa gtttagagaa gatccaatca gtttgagctg gcgctattgt gaagagttct 540
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<210> 14

<211> 574

<212> PRT

<213> Glycine_max .

<400> 14

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Lys Met Gly Thr Val Ser Leu Leu Lys Cys Tyr Arg Pro Phe Phe Ser
 20 25 30

Met Leu Phe Pro His Ser Ala Pro Pro Arg Leu His Ala Ala Ile Phe
 35 40 45

Arg Ser Lys Asn Phe Ser Phe Cys Ala Thr Ser Ser Pro Pro Leu Thr
 50 55 60

Ala Glu Lys Gly Cys Gly Lys Ser Asp Ala Glu Cys Pro Thr Leu Pro
 65 70 75 80

Glu Val Trp Leu His Asn Thr Met Ser Arg Thr Lys Glu Leu Phe Lys
 85 90 95

Pro Lys Val Glu Ser Lys Val Gly Met Tyr Val Cys Gly Val Thr Ala
 100 105 110

Tyr Asp Leu Ser His Ile Gly His Ala Arg Val Tyr Val Asn Phe Asp
 115 120 125

Leu Leu Tyr Arg Tyr Phe Lys His Leu Gly Phe Glu Val Cys Tyr Val
 130 135 140

Arg Asn Phe Thr Asp Val Asp Asp Lys Ile Ile Ala Arg Ala Lys Glu
 145 150 155 160

Leu Gly Glu Asp Pro Ile Ser Leu Ser Trp Arg Tyr Cys Glu Glu Phe
 165 170 175

Cys Gln Asp Met Val Thr Leu Asn Cys Leu Ser Pro Ser Val Glu Pro
 180 185 190

Lys Val Ser Glu His Met Pro Gln Ile Ile Asp Met Ile Glu Lys Ile
195 200 205

Leu Asn Asn Gly Tyr Ala Tyr Ile Val Asp Gly Asp Val Tyr Phe Asn
210 215 220

Val Glu Lys Phe Pro Glu Tyr Gly Lys Leu Ser Ser Arg Asp Leu Glu
225 230 235 240

Asp Asn Arg Ala Gly Glu Arg Val Ala Val Asp Ser Arg Lys Lys Asn
245 250 255

Pro Ala Asp Phe Ala Leu Trp Lys Ser Ala Lys Pro Gly Glu Pro Phe
260 265 270

Trp Glu Ser Pro Trp Gly Pro Gly Arg Pro Gly Trp His Ile Glu Cys
275 280 285

Ser Ala Met Ser Ala Ala Tyr Leu Gly Tyr Ser Phe Asp Ile His Gly
290 295 300

Gly Gly Ile Asp Leu Val Phe Pro His His Glu Asn Glu Ile Ala Gln
305 310 315 320

Ser Cys Ala Ala Cys Lys Lys Ser Asp Ile Ser Ile Trp Met His Asn
325 330 335

Gly Phe Val Thr Ile Asp Ser Val Lys Met Ser Lys Ser Leu Gly Asn
340 345 350

Phe Phe Thr Ile Arg Gln Val Ile Asp Val Tyr His Pro Leu Ala Leu
355 360 365

Arg Tyr Phe Leu Met Ser Ala His Tyr Arg Ser Pro Ile Asn Tyr Ser
370 375 380

Asn Ile Gln Leu Glu Ser Ala Ser Asp Arg Val Phe Tyr Ile Tyr Glu
385 390 395 400

Thr Leu His Glu Cys Glu Ser Phe Leu Asn Gln His Asp Gln Arg Lys
405 410 415

Asp Ser Thr Pro Pro Asp Thr Leu Asp Ile Ile Asp Lys Phe His Asp
420 425 430

Val Phe Leu Thr Ser Met Ser Asp Asp Leu His Thr Pro Val Val Leu
435 440 445

Ala Gly Met Ser Asp Pro Leu Lys Ser Ile Asn Asp Leu Leu His Ala
450 455 460

Arg Lys Gly Lys Lys Gln Gln Phe Arg Ile Glu Ser Leu Ser Ala Leu
465 470 475 480

Glu Lys Ser Val Arg Asp Val Leu Thr Val Leu Gly Leu Met Pro Ala
485 490 495

Ser Tyr Ser Glu Val Leu Gln Gln Leu Lys Val Lys Ala Leu Lys Arg
500 505 510

Ala Asn Phe Thr Glu Glu Glu Val Leu Gln Lys Ile Glu Glu Arg Ala
515 520 525

Thr Ala Arg Met Gln Lys Glu Tyr Ala Lys Ser Asp Ala Ile Arg Lys
530 535 540

Asp Leu Ala Val Leu Gly Ile Thr Leu Met Asp Ser Pro Asn Gly Thr
545 550 555 560

Thr Trp Arg Pro Ala Ile Pro Leu Pro Leu Gln Glu Leu Leu
565 570

<210> 15

<211> 633

<212> DNA

<213> Zea mays

<400> 15

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cacgtcctcc accgtccgcgc gcacttcgcg tacacctgcgtaaaggagtgg cgttgggtgcc 180
cgaggaggag tgctcgcttc tggcatccac ccactccgcgtc gtctcaatttgcagcgcgggtt 240
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tatcttgcat gtggcgtcga cagctccaag gcttctatct ttgtacagtc tcatgtccgt 540
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atgatccagt tcaaagagaa gtctcgcaag gcg 633

<210> 16

<211> 410

<212> PRT

<213> Zea mays

<400> 16

His Gly Asp Asp Ala Met Ser Arg Ala Leu Leu Ser His Val Leu His
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Arg Pro Pro His Phe Ala Tyr Thr Cys Leu Arg Ser Gly Val Gly Ala
20 25 30

Arg Gly Gly Val Leu Ala Ser Gly Ile His Pro Leu Arg Arg Leu Asn
35 40 45

Cys Ser Ala Val Glu Ala Val Pro Gly Pro Thr Glu Glu Ala Pro Ala
50 55 60

Pro Gln Ala Arg Lys Lys Arg Val Val Ser Gly Val Gln Pro Thr Gly
65 70 75 80

Ser Val His Leu Gly Asn Tyr Leu Gly Ala Ile Lys Asn Trp Val Ala
85 90 95

Leu Gln Asp Ser Tyr Glu Thr Phe Phe Ile Val Asp Leu His Ala
100 105 110

Ile Thr Leu Pro Tyr Glu Ala Pro Leu Leu Ser Lys Ala Thr Arg Ser
115 120 125

Thr Ala Ala Ile Tyr Leu Ala Cys Gly Val Asp Ser Ser Lys Ala Ser
 130 135 140
 Ile Phe Val Gln Ser His Val Arg Ala His Val Glu Leu Met Trp Leu
 145 150 155 160
 Leu Ser Ser Ser Thr Pro Ile Gly Trp Leu Asn Arg Met Ile Gln Phe
 165 170 175
 Lys Glu Lys Ser Arg Lys Ala Gly Asp Glu Asn Val Gly Val Ala Leu
 180 185 190
 Leu Thr Tyr Pro Val Leu Met Ala Ser Asp Ile Leu Tyr Gln Ser
 195 200 205
 Asp Leu Val Pro Val Gly Glu Asp Gln Thr Gln His Leu Glu Leu Thr
 210 215 220
 Arg Glu Ile Ala Glu Arg Val Asn Asn Leu Tyr Gly Gly Arg Lys Trp
 225 230 235 240
 Lys Lys Leu Gly Gly Arg Gly Leu Leu Phe Lys Val Pro Glu Ala
 245 250 255
 Leu Ile Pro Pro Ala Gly Ala Arg Val Met Ser Leu Thr Asp Gly Leu
 260 265 270
 Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Gln Ser Arg Ile Asn Leu
 275 280 285
 Leu Asp Pro Lys Asp Val Ile Ala Asn Lys Ile Lys Arg Cys Lys Thr
 290 295 300
 Asp Ser Phe Pro Gly Met Glu Phe Asp Asn Pro Glu Arg Pro Glu Cys
 305 310 315 320
 Arg Asn Leu Leu Ser Ile Tyr Gln Ile Ile Thr Glu Lys Thr Lys Glu
 325 330 335
 Glu Val Val Ser Glu Cys Gln His Met Asn Trp Gly Thr Phe Lys Thr
 340 345 350
 Thr Leu Thr Glu Ala Leu Ile Asp His Leu Gln Pro Ile Gln Val Arg
 355 360 365
 Tyr Glu Glu Ile Met Ser Asp Pro Ala Tyr Leu Asp Asn Val Leu Leu
 370 375 380
 Glu Gly Ala Val Lys Ala Ala Glu Ile Ala Asp Ile Thr Leu Asn Asn
 385 390 395 400
 Val Tyr Gln Ala Met Gly Phe Leu Arg Arg
 405 410

<210> 17
 <211> 1536
 <212> DNA
 <213> Glycine max

<400> 17

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gatatacgat attctacact taataatatt taccaagca tggtttttt taagagacag 1200
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tggaaatgga aagattattt atgcaaaagcc taaaggcccattt gatgcaatgg 1380
gctttgtatc tccttcattt ttctccgagt atggtcgttgc ctttcatttt atattttttt 1440
gttcaatct ctttcattt ttacttgcattt ttataatga attcagcata ttgataaattt 1500
gttccggcat tgtatTTAAA aaaaaaaaaaaaaaaa 1536

<210> 18

<211> 400

<212> PRT

<213> Glycine max

<400> 18

Ala Arg Gly Lys Met Ser Val Ser His Phe Ala Val Leu Ser Ser Cys
1 5 10 15

Cys Cys Pro Arg Leu Ala Pro Ser Leu Ser Arg Ala Ser Thr Leu Arg
20 25 30

Ser Arg Ile Arg Cys Cys Thr Thr Leu Thr Ala Thr Ser Ser Glu Thr
35 40 45

Pro Thr Pro Thr Phe Val Lys Lys Arg Val Val Ser Gly Val Gln Pro
50 55 60

Thr Gly Ser Ile His Leu Gly Asn Tyr Phe Gly Ala Ile Lys Asn Trp
65 70 75 80

Val Ala Leu Gln Asn Val Tyr Asp Thr Leu Phe Phe Ile Val Asp Leu
85 90 95

His Ala Ile Thr Leu Pro Tyr Asp Thr Gln Gln Leu Ser Lys Ala Thr
100 105 110

Arg Ser Thr Ala Ala Ile Tyr Leu Ala Cys Gly Val Asp Pro Ser Lys
115 120 125

Ala Ser Val Phe Val Gln Ser His Val Arg Ala His Val Glu Leu Met
130 135 140

Trp Leu Leu Ser Ser Thr Thr Pro Ile Gly Trp Leu Asn Lys Met Ile
145 150 155 160

Gln Phe Lys Glu Lys Ser Arg Lys Ala Gly Asp Glu Glu Val Gly Val
165 170 175

Ala Leu Leu Thr Tyr Pro Val Leu Met Ala Ser Asp Ile Leu Leu Tyr
180 185 190

Gln Ser Asp Phe Val Pro Val Gly Glu Asp Gln Lys Gln His Leu Glu
195 200 205

Leu Thr Arg Asp Leu Ala Glu Arg Val Asn Asn Leu Tyr Gly Gly Arg
210 215 220

Lys Trp Lys Lys Leu Gly Gly Tyr Asp Ser Arg Gly Gly Thr Ile Phe
225 230 235 240

Lys Val Pro Glu Pro Leu Ile Pro Pro Ala Gly Ala Arg Ile Met Ser
245 250 255

Leu Thr Asp Gly Leu Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Gln
260 265 270

Ser Arg Ile Asn Ile Leu Asp Pro Lys Asp Leu Ile Ala Asn Lys Ile
275 280 285

Lys Arg Cys Lys Thr Asp Ser Phe Pro Gly Leu Glu Phe Asp Asn Ser
290 295 300

Glu Arg Pro Glu Cys Asn Asn Leu Val Ser Ile Tyr Gln Leu Ile Ser
305 310 315 320

Gly Lys Thr Lys Glu Glu Val Val Gln Glu Cys Gln Asn Met Asn Trp
325 330 335

Gly Thr Phe Lys Pro Leu Leu Thr Asp Ala Leu Ile Asp His Leu His
340 345 350

Pro Ile Gln Val Arg Tyr Glu Glu Ile Met Ser Asp Ser Gly Tyr Leu
355 360 365

Asp Gly Val Leu Ala Gln Gly Ala Arg Asn Ala Ala Asp Ile Ala Asp
370 375 380

Ser Thr Leu Asn Asn Ile Tyr Gln Ala Met Gly Phe Phe Lys Arg Gln
385 390 395 400

<210> 19

<211> 725

<212> DNA

<213> Triticum aestivum

<400> 19

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ccttcagatt tgtctcgat taaccttctt gacccaaatg atgtgattgt gaacaaaatc 180
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agtgaatgcc aagatatatgaa ctgggggacg ttcaagggtta cccttacgga tgccttaatt 360
gatcatctgc aaccttattca ggttcgatac gaggagatca tgtctgatcc aggttatttg 420
gacaatgttc tgctaaatgg ggcaggaaa gcttctgaga tagcagacgc caccctcaac 480
aacgtctacc aagccatggg tttctgcgc agatagcata tgtagaacat ttttataac 540
tgcacaatgc tagttttgca cttgttgcc tttctgctag tggtaactgat aagcgtttg 600
tttgatatgc ttggatttagc cttttgtcc tggttattat ggacactgtt aataggtatt 660
aaaaggatta tttaactgaaa aaaaaaaaaa aaaaaaaaaa attaaaaggg ggcgcgcgta 720
ccata 725

<210> 20
<211> 171
<212> PRT
<213> Triticum aestivum

<400> 20
Leu Val Pro Asn Ser Ala Arg Gly Gly Ser Leu Phe Lys Val Pro Glu
1 5 10 15

Ala Leu Ile Pro Pro Ala Gly Ala Arg Val Met Ser Leu Thr Asp Gly
20 25 30

Leu Ser Lys Met Ser Lys Ser Ala Pro Ser Asp Leu Ser Arg Ile Asn
35 40 45

Leu Leu Asp Pro Asn Asp Val Ile Val Asn Lys Ile Lys Arg Cys Lys
50 55 60

Thr Asp Ser Leu Pro Gly Leu Glu Phe Asp Asn Pro Glu Arg Pro Glu
65 70 75 80

Cys Lys Asn Leu Leu Ser Val Tyr Gln Ile Ile Thr Gly Lys Thr Lys
85 90 95

Glu Glu Val Val Ser Glu Cys Gln Asp Met Asn Trp Gly Thr Phe Lys
100 105 110

Val Thr Leu Thr Asp Ala Leu Ile Asp His Leu Gln Pro Ile Gln Val
115 120 125

Arg Tyr Glu Glu Ile Met Ser Asp Pro Gly Tyr Leu Asp Asn Val Leu
130 135 140

Leu Asn Gly Ala Gly Lys Ala Ser Glu Ile Ala Asp Ala Thr Leu Asn
145 150 155 160

Asn Val Tyr Gln Ala Met Gly Phe Leu Arg Arg
165 170

<210> 21
<211> 1062
<212> DNA
<213> Zea mays

<400> 21
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gtacaatgtat cgccaaggag agcgtcaaga agcgtcttgc gtcggaaagac gggatgagct 120
acaccgagtt tacctaccag ctgctgcagg gctacgactt cctttacatg ttcaagaata 180
tgggtgtcaa tggcagatc gggggcagcg atcagtgggg gaacatcaca gcggaactg 240
agttgatcg aaaaatcttgc caggttgaag gggcgatgg actcacattc ccacttctgc 300
tgaagagcga cggatccaaa tttggaaaga cggaggatgg ggcaatctgg ctctttcga 360

<210> 22
<211> 299
<212> PRT
<213> Zea mays

<400> 22

Thr Arg Asp Ile Thr Leu Leu Asp Phe Leu Arg Glu Val Gly Arg Phe
1 , 5 , 10 , 15

Ala Arg Val Gly Thr Met Ile Ala Lys Glu Ser Val Lys Lys Arg Leu
20 25 30

Ala Ser Glu Asp Gly Met Ser Tyr Thr Glu Phe Thr Tyr Gln Leu Leu
35 40 45

Gln Gly Tyr Asp Phe Leu Tyr Met Phe Lys Asn Met Gly Val Asn Val
50 55 60

Gln Ile Gly Gly Ser Asp Gln Trp Gly Asn Ile Thr Ala Gly Thr Glu
65 70 75 80

Leu Ile Arg Lys Ile Leu Gln Val Glu Gly Ala His Gly Leu Thr Phe
 85 90 95

Pro Leu Leu Leu Lys Ser Asp Gly Thr Lys Phe Gly Lys Thr Glu Asp
 100 105 110

Gly Ala Ile Trp Leu Ser Ser Lys Met Leu Ser Pro Tyr Lys Phe Tyr
115 120 125

Gln Tyr Phe Phe Ala Val Pro Asp Ile Asp Val Ile Arg Phe Met Lys
130 135 140

Ile Leu Thr Phe Leu Ser Leu Asp Glu Ile Leu Glu Leu Glu Asp Ser
145 150 155 160

Met Lys Lys Pro Gly Tyr Val Pro Asn Thr Val Gln Lys Arg Leu Ala
165 170 175

Glu Glu Val Thr Arg Phe Val His Gly Glu Glu Gly Leu Glu Glu Ala
180 185 190

Leu Lys Ala Thr Glu Ala Leu Arg Pro Gly Ala Gln Thr Gln Leu Asp
195 200 205

Ala Gin Thr Ile Glu Glu Ile Ala Asp Asp Val Pro Ser Cys Ser Leu
210 215 220

Ala Tyr Asp Gln Val Phe Lys Ser Pro Leu Ile Asp Leu Ala Val Ser
 225 230 235 240

Thr Gly Leu Leu Thr Ser Lys Ser Ala Val Lys Arg Leu Ile Lys Gln
 245 250 255

Gly Gly Leu Tyr Leu Asn Asn Val Arg Ile Asp Ser Glu Asp Lys Leu
 260 265 270

Val Glu Glu Gly Asp Ile Val Asp Gly Lys Val Leu Leu Ser Ala
 275 280 285

Gly Lys Lys Asn Lys Met Val Val Arg Ile Ser
 290 295

<210> 23
 <211> 346
 <212> PRT
 <213> Drosophila melanogaster

<400> 23
 Met Val Asp Lys Val Ala Asn Gly Val Ser Lys Lys Gly Ala Lys Lys
 1 5 10 15

Ala Lys Ala Ala Lys Lys Ala Lys Ala Asn Ala Ser Thr Ala Ala Ala
 20 25 30

Asn Asn Ser Gly Gly Asp Ser Ala Asp His Ala Ala Gly Arg Tyr Gly
 35 40 45

Ser Met Ser Lys Asp Lys Arg Ser Arg Asn Val Val Ser Ser Gly Val
 50 55 60

Gly Lys Gly Val Trp Val Arg Gly Arg Val His Thr Ser Arg Ala Lys
 65 70 75 80

Gly Lys Cys Arg Ser Ser Thr Val Cys Ala Val Gly Asp Val Ser Lys
 85 90 95

Met Val Lys Ala Gly Asn Lys Ser Asp Ala Lys Val Ala Val Ser Ser
 100 105 110

Lys Ser Cys Thr Ser Ser Val Val Ser Ala Lys Ala Asp Ala Ser Arg
 115 120 125

Asn Ala Asp Asp Ala Gly Asn Arg Val Asn Asp Thr Arg Asp Asn Arg
 130 135 140

Val Asp Arg Thr Ala Asn Ala Arg Ala Gly Val Cys Arg Arg Asp Thr
 145 150 155 160

Gly Thr His Thr Lys Ser Ala Ala Ser Gly Gly Ala Asn Val Thr Val
 165 170 175

Ser Tyr Lys Asp Ser Ala Tyr Ala Ser Tyr Lys Met Ala Ala Ala Asp
 180 185 190

Asp Lys Val Tyr Thr Val Gly Ala Val Arg Ala Asp Ser Asn Thr His
 195 200 205

Arg His Thr Val Gly Asp Met Ala Lys Tyr His Tyr His Val His Thr
 210 215 220
 Gly Asn Thr Thr Ser Lys Gly Arg Asp Lys Tyr Ala Lys Ser Val Gly
 225 230 235 240
 Tyr Lys Val Asp Ala Lys Ala Asp Gly Val Ala Met Arg Ala Gly Val
 245 250 255
 Thr Gly Asp Asp Ser Thr Asn Lys Gly Arg Val Lys Ala Lys Tyr Asp
 260 265 270
 Thr Asp Tyr Asp Lys Ala Arg Tyr Thr Met Asp Asn Asn Val Tyr Ser
 275 280 285
 Asn Ser Tyr Asp Met Met Arg Gly Ser Gly Ala Arg His Asp Tyr Arg
 290 295 300
 Ala Lys His His Gly Asp Thr Ser Lys Ala Ala Tyr Ser Arg Tyr Gly
 305 310 315 320
 Cys His Ala Gly Gly Gly Met Arg Val Val Met Tyr Gly Asp Asn
 325 330 335
 Arg Lys Thr Ser Met Arg Asp Lys Arg Thr
 340 345
 <210> 24
 <211> 501
 <212> PRT
 <213> Rattus norvegicus
 <400> 24
 Met Pro Ser Ala Asn Ala Ser Arg Lys Gly Gln Glu Lys Pro Arg Glu
 1 5 10 15
 Ile Val Asp Ala Ala Glu Asp Tyr Ala Lys Glu Arg Tyr Gly Val Ser
 20 25 30
 Ser Met Ile Gln Ser Gln Glu Lys Pro Asp Arg Val Leu Val Arg Val
 35 40 45
 Lys Asp Leu Thr Val Gln Lys Ala Asp Glu Val Val Trp Val Arg Ala
 50 55 60
 Arg Val His Thr Ser Arg Ala Lys Gly Lys Gln Cys Phe Leu Val Leu
 65 70 75 80
 Arg Gln Gln Gln Phe Asn Val Gln Ala Leu Val Ala Val Gly Asp His
 85 90 95
 Ala Ser Lys Gln Met Val Lys Phe Ala Ala Asn Ile Asn Lys Glu Ser
 100 105 110
 Ile Ile Asp Val Glu Gly Ile Val Arg Lys Val Asn Gln Lys Ile Gly
 115 120 125
 Ser Cys Thr Gln Gln Asp Val Glu Leu His Val Gln Lys Ile Tyr Val
 130 135 140

Ile Ser Leu Ala Glu Pro Arg Leu Pro Leu Gln Leu Asp Asp Ala Ile
 145 150 155 160
 Arg Pro Glu Val Glu Gly Glu Asp Gly Arg Ala Thr Val Asn Gln
 165 170 175
 Asp Thr Arg Leu Asp Asn Arg Ile Ile Asp Leu Arg Thr Ser Thr Ser
 180 185 190
 Gln Ala Ile Phe His Leu Gln Ser Gly Ile Cys His Leu Phe Arg Glu
 195 200 205
 Thr Leu Ile Asn Lys Gly Phe Val Glu Ile Gln Thr Pro Lys Ile Ile
 210 215 220
 Ser Ala Ala Ser Glu Gly Gly Ala Asn Val Phe Thr Val Ser Tyr Phe
 225 230 235 240
 Lys Ser Asn Ala Tyr Leu Ala Gln Ser Pro Gln Leu Tyr Lys Gln Met
 , 245 . 250 . 255
 Cys Ile Cys Ala Asp Phe Glu Lys Val Phe Cys Ile Gly Pro Val Phe
 260 265 270
 Arg Ala Glu Asp Ser Asn Thr His Arg His Leu Thr Glu Phe Val Gly
 275 280 285
 Leu Asp Ile Glu Met Ala Phe Asn Tyr His Tyr His Glu Val Val Glu
 290 295 300
 Glu Ile Ala Asp Thr Leu Val Gln Ile Phe Lys Gly Leu Gln Glu Arg
 305 310 315 320
 Phe Gln Thr Glu Ile Gln Thr Val Asn Lys Gln Phe Pro Cys Glu Pro
 325 330 335
 Phe Lys Phe Leu Glu Pro Thr Leu Arg Leu Glu Tyr Cys Glu Ala Leu
 340 345 350
 Ala Met Leu Arg Glu Ala Gly Val Glu Met Asp Asp Glu Glu Asp Leu
 355 360 365
 Ser Thr Pro Asn Glu Lys Leu Leu Gly Arg Leu Val Lys Glu Lys Tyr
 370 375 380
 Asp Thr Asp Phe Tyr Val Leu Asp Lys Tyr Pro Leu Ala Val Arg Pro
 385 390 395 400
 Phe Tyr Thr Met Pro Asp Pro Arg Asn Pro Lys Gln Ser Asn Ser Tyr
 405 410 415
 Asp Met Phe Met Arg Gly Glu Glu Ile Leu Ser Gly Ala Gln Arg Ile
 420 425 430
 His Asp Pro Gln Leu Leu Thr Glu Arg Ala Leu His His Gly Ile Asp
 435 440 445
 Leu Glu Lys Ile Lys Ala Tyr Ile Asp Ser Phe Arg Phe Gly Ala Pro
 450 455 460

Pro His Ala Gly Gly Ile Gly Leu Glu Arg Val Thr Met Leu Phe
 465 470 475 480
 Leu Gly Leu His Asn Val Arg Gln Thr Ser Met Phe Pro Arg Asp Pro
 485 490 495
 Lys Arg Leu Thr Pro
 500
 <210> 25
 <211> 500
 <212> PRT
 <213> Homo sapiens
 <400> 25
 Met Pro Ser Ala Thr Gln Arg Lys Ser Gln Glu Lys Pro Arg Glu Ile
 1 5 10 15
 Met Asp Ala Ala Glu Asp Tyr Ala Lys Glu Arg Tyr Gly Ile Ser Ser
 20 , 25 , 30
 Met Ile Gln Ser Gln Glu Lys Pro Asp Arg Val Leu Val Arg Val Arg
 35 40 45
 Asp Leu Thr Ile Gln Lys Ala Asp Glu Val Val Trp Val Arg Ala Arg
 50 55 60
 Val His Thr Ser Arg Ala Lys Gly Lys Gln Cys Phe Leu Val Leu Arg
 65 70 75 80
 Gln Gln Gln Phe Asn Val Gln Ala Leu Val Ala Val Gly Asp His Ala
 85 90 95
 Ser Lys Gln Met Val Lys Phe Ala Ala Asn Ile Asn Lys Glu Ser Ile
 100 105 110
 Val Asp Val Glu Gly Val Val Arg Lys Val Asn Gln Lys Ile Gly Ser
 115 120 125
 Cys Thr Gln Gln Asp Val Glu Leu His Val Gln Lys Ile Tyr Val Ile
 130 135 140
 Ser Leu Ala Glu Pro Arg Leu Pro Leu Gln Leu Asp Asp Ala Val Arg
 145 150 155 160
 Pro Glu Gln Glu Gly Glu Glu Gly Arg Ala Thr Val Asn Gln Asp
 165 170 175
 Thr Arg Leu Asp Asn Arg Val Ile Asp Leu Arg Thr Ser Thr Ser Gln
 180 185 190
 Ala Val Phe Arg Leu Gln Ser Gly Ile Cys His Leu Phe Arg Glu Thr
 195 200 205
 Leu Ile Asn Lys Gly Phe Val Glu Ile Gln Thr Pro Lys Ile Ile Ser
 210 215 220
 Ala Ala Ser Glu Gly Gly Ala Asn Val Phe Thr Val Ser Tyr Phe Lys
 225 230 235 240

Asn	Asn	Ala	Tyr	Leu	Ala	Gln	Ser	Pro	Gln	Leu	Tyr	Lys	Gln	Met	Cys
				245					250					255	
Ile	Cys	Ala	Asp	Phe	Glu	Lys	Val	Phe	Ser	Ile	Gly	Pro	Val	Phe	Arg
	260				265					270					
Ala	Glu	Asp	Ser	Asn	Thr	His	Arg	His	Leu	Thr	Glu	Phe	Val	Gly	Leu
	275				280				285						
Asp	Ile	Glu	Met	Ala	Phe	Asn	Tyr	His	Tyr	His	Glu	Val	Met	Glu	Glu
	290				295				300						
Ile	Ala	Asp	Thr	Met	Val	Gln	Ile	Phe	Lys	Gly	Leu	Gln	Glu	Arg	Phe
	305				310				315			320			
Gln	Thr	Glu	Ile	Gln	Thr	Val	Asn	Lys	Gln	Phe	Pro	Cys	Glu	Pro	Phe
	325				330				335						
Lys	Phe	Leu	Glu	Pro	Thr	Leu	Arg	Leu	Glu	Tyr	Cys	Glu	Ala	Leu	Ala
	340				345				350						
Met	Leu	Arg	Glu	Ala	Gly	Val	Glu	Met	Gly	Asp	Glu	Asp	Asp	Leu	Ser
	355				360			365							
Thr	Pro	Asn	Glu	Lys	Leu	Leu	Gly	His	Leu	Val	Lys	Glu	Lys	Tyr	Asp
	370				375			380							
Thr	Asp	Phe	Tyr	Ile	Leu	Asp	Lys	Tyr	Pro	Leu	Ala	Val	Arg	Pro	Phe
	385				390			395			400				
Tyr	Thr	Met	Pro	Asp	Pro	Arg	Asn	Pro	Lys	Gln	Ser	Lys	Ser	Tyr	Asp
									405		410			415	
Met	Phe	Met	Arg	Gly	Glu	Glu	Ile	Leu	Ser	Gly	Ala	Gln	Arg	Ile	His
					420			425			430				
Asp	Pro	Gln	Leu	Leu	Thr	Glu	Arg	Ala	Leu	His	His	Gly	Asn	Asp	Leu
					435			440			445				
Glu	Lys	Ile	Lys	Ala	Tyr	Ile	Asp	Ser	Phe	Arg	Phe	Gly	Ala	Pro	Pro
					450			455			460				
His	Ala	Gly	Gly	Gly	Ile	Gly	Leu	Glu	Arg	Val	Thr	Met	Leu	Phe	Leu
					465			470			475			480	
Gly	Leu	His	Asn	Val	Arg	Gln	Thr	Ser	Met	Phe	Pro	Arg	Asp	Pro	Lys
					485				490			495			
Arg	Leu	Thr	Pro												
				500											
<210>	26														
<211>	459														
<212>	PRT														
<213>	Haemophilus	influenzae	Rd												
<400>	26														
Met	Leu	Lys	Ile	Phe	Asn	Thr	Leu	Thr	Arg	Glu	Lys	Glu	Ile	Phe	Lys
1				5					10				15		

Pro Ile His Glu Asn Lys Val Gly Met Tyr Val Cys Gly Val Thr Val
 20 25 30

Tyr Asp Leu Cys His Ile Gly His Gly Arg Thr Phe Val Cys Phe Asp
 35 40 45

Val Ile Ala Arg Tyr Leu Arg Ser Leu Gly Tyr Asp Leu Thr Tyr Val
 50 55 60

Arg Asn Ile Thr Asp Val Asp Asp Lys Ile Ile Lys Arg Ala Leu Glu
 65 70 75 80

Asn Lys Glu Thr Cys Asp Gln Leu Val Asp Arg Met Val Gln Glu Met
 85 90 95

Tyr Lys Asp Phe Asp Ala Leu Asn Val Leu Arg Pro Asp Phe Glu Pro
 100 105 110

Arg Ala Thr His His Ile Pro Glu Ile Ile Glu Ile Val Glu Lys Leu
 115 ' 120 ' 125

Ile Lys Arg Gly His Ala Tyr Val Ala Asp Asn Gly Asp Val Met Phe
 130 135 140

Asp Val Glu Ser Phe Lys Glu Tyr Gly Lys Leu Ser Arg Gln Asp Leu
 145 150 155 160

Glu Gln Leu Gln Ala Gly Ala Arg Ile Glu Ile Asn Glu Ile Lys Lys
 165 170 175

Asn Pro Met Asp Phe Val Leu Trp Lys Met Ser Lys Glu Asn Glu Pro
 180 185 190

Ser Trp Ala Ser Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu
 195 200 205

Cys Ser Ala Met Asn Cys Lys Gln Leu Gly Glu Tyr Phe Asp Ile His
 210 215 220

Gly Gly Gly Ser Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala
 225 230 235 240

Gln Ser Cys Cys Ala His Gly Gly Gln Tyr Val Asn Tyr Trp Ile His
 245 250 255

Ser Gly Met Ile Met Val Asp Lys Glu Lys Met Ser Lys Ser Leu Gly
 260 265 270

Asn Phe Phe Thr Ile Arg Asp Val Leu Asn His Tyr Asn Ala Glu Ala
 275 280 285

Val Arg Tyr Phe Leu Leu Thr Ala His Tyr Arg Ser Gln Leu Asn Tyr
 290 295 300

Ser Glu Glu Asn Leu Asn Leu Ala Gln Gly Ala Leu Glu Arg Leu Tyr
 305 310 315 320

Thr Ala Leu Arg Gly Thr Asp Gln Ser Ala Val Ala Phe Gly Gly Glu
 325 330 335

Asn	Phe	Val	Ala	Thr	Phe	Arg	Glu	Ala	Met	Asp	Asp	Asp	Phe	Asn	Thr
340														350	
Pro	Asn	Ala	Leu	Ser	Val	Leu	Phe	Glu	Met	Ala	Arg	Glu	Ile	Asn	Lys
355														365	
Leu	Lys	Thr	Glu	Asp	Val	Glu	Lys	Ala	Asn	Gly	Leu	Ala	Ala	Arg	Leu
370														380	
Arg	Glu	Leu	Gly	Ala	Ile	Leu	Gly	Leu	Leu	Gln	Gln	Glu	Pro	Glu	Lys
385														400	
Phe	Leu	Gln	Ala	Gly	Ser	Asn	Asp	Asp	Glu	Val	Ala	Lys	Ile	Glu	Ala
405														415	
Leu	Ile	Lys	Gln	Arg	Asn	Glu	Ala	Arg	Thr	Ala	Lys	Asp	Trp	Ser	Ala
420														430	
Ala	Asp	Ser	Ala	Arg	Asn	Glu	Leu	Thr	Ala	Met	Gly	Ile	Val	Leu	Glu
435	.	.					440	.	.			445			
Asp	Gly	Pro	Asn	Gly	Thr	Thr	Trp	Arg	Lys	Gln					
450							455								
<210>	27														
<211>	461														
<212>	PRT														
<213>	Escherichia coli														
<400>	27														
Met	Leu	Lys	Ile	Phe	Asn	Thr	Leu	Thr	Arg	Gln	Lys	Glu	Glu	Phe	Lys
1							5			10				15	
Pro	Ile	His	Ala	Gly	Glu	Val	Gly	Met	Tyr	Val	Cys	Gly	Ile	Thr	Val
														30	
Tyr	Asp	Leu	Cys	His	Ile	Gly	His	Gly	Arg	Thr	Phe	Val	Ala	Phe	Asp
							35			40				45	
Val	Val	Ala	Arg	Tyr	Leu	Arg	Phe	Leu	Gly	Tyr	Lys	Leu	Lys	Tyr	Val
								50			55			60	
Arg	Asn	Ile	Thr	Asp	Ile	Asp	Asp	Lys	Ile	Ile	Lys	Arg	Ala	Asn	Glu
								65			70			75	
Asn	Gly	Glu	Ser	Phe	Val	Ala	Met	Val	Asp	Arg	Met	Ile	Ala	Glu	Met
								85			90			95	
His	Lys	Asp	Phe	Asp	Ala	Leu	Asn	Ile	Leu	Arg	Pro	Asp	Met	Glu	Pro
								100			105			110	
Arg	Ala	Thr	His	His	Ile	Ala	Glu	Ile	Ile	Glu	Leu	Thr	Glu	Gln	Leu
								115			120			125	
Ile	Ala	Lys	Gly	His	Ala	Tyr	Val	Ala	Asp	Asn	Gly	Asp	Val	Met	Phe
								130			135			140	
Asp	Val	Pro	Thr	Asp	Pro	Thr	Tyr	Gly	Val	Leu	Ser	Arg	Gln	Asp	Leu
								145			150			155	
														160	

Asp Gln Leu Gln Ala Gly Ala Arg Val Asp Val Val Asp Asp Lys Arg
165 170 175

Asn Pro Met Asp Phe Val Leu Trp Lys Met Ser Lys Glu Gly Glu Pro
180 185 190

Ser Trp Pro Ser Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu
195 200 205

Cys Ser Ala Met Asn Cys Lys Gln Leu Gly Asn His Phe Asp Ile His
210 215 220

Gly Gly Gly Ser Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala
225 230 235 240

Gln Ser Thr Cys Ala His Asp Gly Gln Tyr Val Asn Tyr Trp Met His
245 250 255

Ser Gly Met Val Met Val Asp Arg Glu Lys Met Ser Lys Ser Leu Gly
260 265 270

Asn Phe Phe Thr Val Arg Asp Val Leu Lys Tyr Tyr Asp Ala Glu Thr
275 280 285

Val Arg Tyr Phe Leu Met Ser Gly His Tyr Arg Ser Gln Leu Asn Tyr
290 295 300

Ser Glu Glu Asn Leu Lys Gln Ala Arg Ala Ala Val Glu Arg Leu Tyr
305 310 315 320

Thr Ala Leu Arg Gly Thr Asp Lys Thr Val Ala Pro Ala Gly Gly Glu
325 330 335

Ala Phe Glu Ala Arg Phe Ile Glu Ala Met Asp Asp Asp Phe Asn Thr
340 345 350

Pro Glu Ala Tyr Ser Val Leu Phe Asp Met Ala Arg Glu Val Asn Arg
355 360 365

Leu Lys Ala Glu Asp Met Ala Ala Ala Asn Ala Met Ala Ser His Leu
370 375 380

Arg Lys Leu Ser Ala Val Leu Gly Leu Leu Glu Gln Glu Pro Glu Ala
385 390 395 400

Phe Leu Gln Ser Gly Ala Gln Ala Asp Asp Ser Glu Val Ala Glu Ile
405 410 415

Glu Ala Leu Ile Gln Gln Arg Leu Asp Ala Arg Lys Ala Lys Asp Trp
420 425 430

Ala Ala Ala Asp Ala Ala Arg Asp Arg Leu Asn Glu Met Gly Ile Val
435 440 445

Leu Glu Asp Gly Pro Gln Gly Thr Thr Trp Arg Arg Lys
450 455 460

<210> 28
<211> 377

<212> PRT

<213> Synechocystis sp.

<400> 28

Met Lys Asn Cys Glu Asn Asp His Arg Phe Thr Thr Val Ser Ser Gly
1 5 10 15

Lys Ala Trp Gly Gln Leu His Arg Phe Pro Ser Leu Ile Lys Phe Asn
20 25 30

Phe Ala His Arg Ser Thr Thr Ala Met Asp Lys Pro Arg Ile Leu Ser
35 40 45

Gly Val Gln Pro Thr Gly Asn Leu His Leu Gly Asn Tyr Leu Gly Ala
50 55 60

Ile Arg Ser Trp Val Glu Gln Gln His Tyr Asp Asn Phe Phe Cys
65 70 75 80

Val Val Asp Leu His Ala Ile Thr Val Pro His Asn Pro Gln Thr Leu
85 90 95

Ala Gln Asp Thr Leu Thr Ile Ala Ala Leu Tyr Leu Ala Cys Gly Ile
100 105 110

Asp Leu Gln Tyr Ser Thr Ile Phe Val Gln Ser His Val Ala Ala His
115 120 125

Ser Glu Leu Ala Trp Leu Leu Asn Cys Val Thr Pro Leu Asn Trp Leu
130 135 140

Glu Arg Met Ile Gln Phe Lys Glu Lys Ala Val Lys Gln Gly Glu Asn
145 150 155 160

Val Ser Val Gly Leu Leu Asp Tyr Pro Val Leu Met Ala Ala Asp Ile
165 170 175

Leu Leu Tyr Asp Ala Asp Lys Val Pro Val Gly Glu Asp Gln Lys Gln
180 185 190

His Leu Glu Leu Thr Arg Asp Ile Val Ile Arg Ile Asn Asp Lys Phe
195 200 205

Gly Arg Glu Asp Ala Pro Val Leu Lys Leu Pro Glu Pro Leu Ile Arg
210 215 220

Lys Glu Gly Ala Arg Val Met Ser Leu Ala Asp Gly Thr Lys Lys Met
225 230 235 240

Ser Lys Ser Asp Glu Ser Glu Leu Ser Arg Ile Asn Leu Leu Asp Pro
245 250 255

Pro Glu Met Ile Lys Lys Val Lys Lys Cys Lys Thr Asp Pro Gln
260 265 270

Arg Gly Leu Trp Phe Asp Asp Pro Glu Arg Pro Glu Cys His Asn Leu
275 280 285

Leu Thr Leu Tyr Thr Leu Leu Ser Asn Gln Thr Lys Glu Ala Val Ala
290 295 300

Gln Glu Cys Ala Glu Met Gly Trp Gly Gln Phe Lys Pro Leu Leu Thr
 305 310 315 320

Glu Thr Ala Ile Ala Ala Leu Glu Pro Ile Gln Ala Lys Tyr Ala Glu
 325 330 335

Ile Leu Ala Asp Arg Gly Glu Leu Asp Arg Ile Ile Gln Ala Gly Asn
 340 345 350

Ala Lys Ala Ser Gln Thr Ala Gln Gln Thr Leu Ala Arg Val Arg Asp
 355 360 365

Ala Leu Gly Phe Leu Ala Pro Pro Tyr
 370 375

<210> 29
 <211> 419
 <212> PRT
 <213> *Bacillus caldogenax*

<400> 29

Met Asp Leu Leu Ala Glu Leu Gln Trp Arg Gly Leu Val Asn Gln Thr
 1 5 10 15

Thr Asp Glu Asp Gly Leu Arg Lys Leu Leu Asn Glu Glu Arg Val Thr
 20 25 30

Leu Tyr Cys Gly Phe Asp Pro Thr Ala Asp Ser Leu His Ile Gly Asn
 35 40 45

Leu Ala Ala Ile Leu Thr Leu Arg Arg Phe Gln Gln Ala Gly His Arg
 50 55 60

Pro Ile Ala Leu Val Gly Gly Ala Thr Gly Leu Ile Gly Asp Pro Ser
 65 70 75 80

Gly Lys Lys Ser Glu Arg Thr Leu Asn Ala Lys Glu Thr Val Glu Ala
 85 90 95

Trp Ser Ala Arg Ile Lys Glu Gln Leu Gly Arg Phe Leu Asp Phe Glu
 100 105 110

Ala Asp Gly Asn Pro Ala Lys Ile Lys Asn Asn Tyr Asp Trp Ile Gly
 115 120 125

Pro Leu Asp Val Ile Thr Phe Leu Arg Asp Val Gly Lys His Phe Ser
 130 135 140

Val Asn Tyr Met Met Ala Lys Glu Ser Val Gln Ser Arg Ile Glu Thr
 145 150 155 160

Gly Ile Ser Phe Thr Glu Phe Ser Tyr Met Met Leu Gln Ala Tyr Asp
 165 170 175

Phe Leu Arg Leu Tyr Glu Thr Glu Gly Cys Arg Leu Gln Ile Gly Gly
 180 185 190

Ser Asp Gln Trp Gly Asn Ile Thr Ala Gly Leu Glu Leu Ile Arg Lys
 195 200 205

Thr Lys Gly Glu Ala Arg Ala Phe Gly Leu Thr Ile Pro Leu Val Thr
210 215 220

Lys Ala Asp Gly Thr Lys Phe Gly Lys Thr Glu Ser Gly Thr Ile Trp
225 230 235 240

Leu Asp Lys Glu Lys Thr Ser Pro Tyr Glu Phe Tyr Gln Phe Trp Ile
245 250 255

Asn Thr Asp Asp Arg Asp Val Ile Arg Tyr Leu Lys Tyr Phe Thr Phe
260 265 270

Leu Ser Lys Glu Glu Ile Glu Ala Leu Glu Gln Glu Leu Arg Glu Ala
275 280 285

Pro Glu Lys Arg Ala Ala Gln Lys Ala Leu Ala Glu Glu Val Thr Lys
290 295 300

Leu Val His Gly Glu Glu Ala Leu Arg Gln Ala Ile Arg Ile Ser Glu
305 310 315 320

Ala Leu Phe Ser Gly Asp Ile Ala Asn Leu Thr Ala Ala Glu Ile Glu
325 330 335

Gln Gly Phe Lys Asp Val Pro Ser Phe Val His Glu Gly Gly Asp Val
340 345 350

Pro Leu Val Glu Leu Leu Val Ser Ala Gly Ile Ser Pro Ser Lys Arg
355 360 365

Gln Ala Arg Glu Asp Ile Gln Asn Gly Ala Ile Tyr Val Asn Gly Glu
370 375 380

Arg Leu Gln Asp Val Gly Ala Ile Leu Thr Ala Glu His Arg Leu Glu
385 390 395 400

Gly Arg Phe Thr Val Ile Arg Arg Gly Lys Lys Lys Tyr Tyr Leu Ile
405 410 415

Arg Tyr Ala